Masami MIZUSHIMA*: A preliminary revision of the genus *Sagina* of Japan and its adjacent regions (5)

(Critical studies on Japanese plants. 9)**

水島正美*: 日本及び近隣地域のツメクサ属 (5) (日本植物寸評 9)**

6) **Sagina maxima** A. Gray, On the Botany of Japan in Mém. Amer. Acad. Arts & Sci. n. ser. **6**: 382 (1859), in adnota.

Annual or sometimes perennial, usually with one central rosette of leaves which yields the flowering branches within the year or winters. Leaves linear, mucronate to obtuse at the tip, glabrous excepting upper pairs which are often glandular-ciliate to -pubescent. Pedicels (5-) 10-20 (-45) mm long, strict after anthesis glandular-pubescent to glabrous as well as sepals and branches. Sepals 5 rarely 4, (1.8-) 2-2.5 (-3) mm long, elliptical to oval, or ovate-elliptical, white-margined, nearly rounded and scarcely hooded at the apex, feebly 3-nerved still often keeled in fruit on the back, appressed to the ripe capsule. Petals 5 rarely 4 or in cleistogamic flowers degenerated to 0, normally broad ovate, rounded at the apex, shorter than or as long as the calyx. Stamens 5-10. Capsules globular to ovate, equalling to the calyx to surpassing to 1.3 times, opened valves exceeding the calyx up to 1.6 times. Seeds yellowish-brown to dark brown, swallen reniform, weekly compressed laterally, flat to rounded dorsally, 0.4-0.6 mm across, smooth to granulate. Chromosome number 2n=42 or 44.

Distr. sp.: Northern Pacific.

forma **maxima**.

Moehringia seu *Arenaria* n. sp. A. Gray in Perry, Narrat. Exped. Amer. Squadr. China & Jap. **2**: 309 (1856).

Sagina maxima A. Gray, sensu stricto—Franch. et Sav., Enum. Pl. Jap. **1**: 53 (1873), pro parte—Nakai, Fl. Korea. **2**: 451 (1911); Chôsen-shokubutsu 151, fig. 177 (1914); Rep. Veg. Diamond Mts. 159 (1918); Rep. Veg. Dagelet Isl. 18 (1919)—Mori, Enum. Pl. Corea 146 (1922)—Hara in Rhodora **41**: 392 (1939); in Journ. Fac. Sci. Univ. Tokyo. sect. III, Bot. **6** (2): 45 (1952), excl. syn. Lév.; in Journ. Jap. Bot. **33**: 147 (1958)—Ohwi in Acta Phytotax. Geobot. **11**: 251 (1942), in textu; Fl. Jap. 489 (1953).

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** Contribution no. 5 from Makino Herbarium of Tokyo Metropolitan University.

S. maxima var. *magis glandulosa*: A. Gray, l. c. (1859).

S. Linnaei Presl var. *maxima* (A. Gray) Maximowicz in Bull. Acad. Sci. St.-Pét. **18**: 372 (1873)—Ito et Matsumura, Tent. Fl. Lutchu. 316 (1899), quoad specim. leg. Tashiro—Matsum., Ind. Pl. Jap. **2** (2): 86 (1912), pro parte—Hayata, Gen. Ind. Fl. Formosa 7 (1917), pro parte.

S. Linnaei var. *maxima* f. *maritima* Makino in Iinuma, Sômoku-dzusetsu ed. rev. **2**: 641 (1910), nom. seminud.

S. maxima f. *littorea* Mak. in Bot. Mag. Tokyo **25**: 156 (1911), cum diag. brev. angl.—Hara l. c. (1952), in textu.

'*S. Linnaei* Presl': Miyabe et Miyake, Fl. Saghal. 75 (1915), pro parte.

'*S. crassicaulis* Wats.': Nakai in Bot. Mag. Tokyo **38**: (231) (1924), pro parte et excl. syn. Lév.; Synop. Korean Fl. in Bull. Nat. Sci. Mus. no. 31, 38 (1952)—Hara in Bot. Mag. Tokyo **48**: 902 (1934).

S. saginoides Dalla Torre var. *micrantha* Kudo, Rep. Veg. N. Saghal. 122 (1924) quoad pl. ex Pilewo.

S. litoralis Hult., Fl. Kamtch. **2**: 78, fig. 8 & pl. 2, fig. d (1928); ibid. **4**: 248 (1930); Fl. Aleut. Isl. 169 (1937); Fl. Alaska & Yuk. **4**: 673 (1943)—Komarov, Fl. Pen. Kamtsch. 2: 102 (1929)—Tatewaki et Kobayashi, Contr. Fl. Aleut. Isl. 39 (1934).

S. crassicaulis var. *littorea* (Mak.) Hara in Journ. Jap. Bot. **13**: 556 (1937)—Tatew. in Trans. Sapporo Nat. Hist. Soc. **16**: 82 (1940)—Sonohara, Tawada & Amano, ed. Walker, Fl. Okin. 52 (1952)—Masamune, Enum. Tracheoph. Ryukyu Ins. 4 in Sci. Rep. Kanazawa Univ. **2** (2): 35 (1954).

'*S. Taquetii* Léveillé': Ohwi in Acta Phytotax. Geobot. **11**: 251 (1942), cum formis; Fl. Jap. 489 (1953).

S. maxima var. *littorea* (Mak.) Hara in Journ. Jap. Bot. **33**: 147 (1958).

Branches, upper leaves, pedicels and sepals densely glandular-pubescent to very sparingly so barely on the upper end of pedicels or at the base of calyx.

Specim. exam. (important ones only). **Kuriles**: Porosu, Isl. Etorofu (or Isl. Iturup) (Aug. 14, 1928, S. Saito—Herb. H. Hara); Isl. Ekaruma (Aug. 11, 1928, M. Tatewaki, no. 11323—SAP); Moyoro Isl. Etorofu (Aug. 16, 1930, H. Koidzumi, no. 25414—TNS).

Saghalien: Chiishiya, Aniwa Bay (Aug. 18, 1906, K. Miyabe & T. Miyagi—SAP); Cape Notoro (July 19, 1906, K. Miyabe & T. Miyagi—SAP); Rore, Toyohara Distr. (Sept. 27, 1906, T. Miyake—SAP); Pilewo, w. coast, n. of 50°N

(Aug. 13, 1906, K. Miyabe & T. Miyagi—SAP).

Japan: "Japan" (C. Wright—P), this is the collection of the U. S. North Pacific Exploring Expedition under Commanders Ringgold and Rodgers, 1853—56, therefore it must be the isotype of *S. maxima* A. Gray collected between the end of 1854 (?) and June, 1855; *Hokkaido* (Yezo); Rebunshiri (Isl. Rebun, n. Hokkaido) (Oct. 13, 1894, U. Faurie, no. 13878—P), seashore, Ishikari (Aug. 1880, J. Matsum.—TI), Takashima, Shiribeshi, Aug. 5, 1899, J. Matsum.—TI), Horoman, Hidaka (Jun. 19, 1884, K. Miyabe—TI), falaises de Saruru (prov. Hidaka) (Jul. 20, 1893, U. Faurie, no. 10939—P), seashore at the foot of Mt. Apoi, Hidaka (Aug. 1928, T. Nakai—TI), Hakodate, Oshima (Jul. 10, K. Miyabe & E. Tokubuchi —TI); *Honshu*; Yokoska, Nippon (prov. Sagami, Kwantô Distr.) (Mai 1866, Savatier, no. 128—P), in part, Kioto (prov. Yamashiro) (Jun. 1875, Dickins—P), top of Mt. Iwasuge, Shimotakai-gun, prov. Shinano, alt. 2290 m (Jul. 19, 1930, H. Koidzumi, no. 23806—TNS), upper part of Mt. Shirouma (Shirouma hot-spring), prov. Shinano (Aug. 16, 1922, H. Koidzumi, nos. 47349-52—TNS), top of Mt. Daisen, prov. Hôki. alt. 1713 m (Aug. 2, 1935, H. Koidzumi, nos. 99964-72—TNS).

Ryukyus: Isl. Okinawa (or Isl. Uchina) (Mar. 1887, Y. Tashiro—TI).

Formosa: Tamsuy (near the north end of prov. Taihoku) (1864, R. Oldham, no. 28—P); Keelung (north end of Formosa) (Jun. 5, 1906, S. Nagasawa, no. A-648—TI).

Korea: "Sôseki-tei" (north of Tongchon, Kangwon-do) (Aug. 31, 1916, T. Nakai, no. 5394 but without date—TI); Tôdon, Isl. Ooryongto (or Dagelet Isl.) (Jun. 1, 1917, T. Nakai, no. 4273—TI).

China: *e. Tibet*; Yatung, alt. 10000 ft. (May 15, 1945, Bor & Kirat Ram, no. 19279—DD), in part; *Yunnan*; lieux ombragé, Tali (Sept. 26, 1888, J. M. Delavay, no. 3638—P), Wei-si Hsien, alt. 2300 m (Jun. 1935, C. W. Wang, no. 63552—GH); *Chekiang*; Ningpo Mts. (1889, E. Faber, no. 674—K).

Distr.: Ussuri, Korean Archipelago, s. to c. Saghalien, Kamtschatka, Japan (throughout the maritime region, sometimes tolerating into inlands and rarely ascending up to 2290 m on the Japan Sea side of Honshû), the Kuriles, the Aleutians, s. Alaska, the Ryukyus, Formosa, the Bonins, China (e. Tibet! Yunnan! Chekiang!).

forma **crassicaulis** (Watson) Mizushima, stat. nov.

S. crassicaulis Wats. in Proc. Amer. Acad. Arts & Sci. **18**: 191 (1883)—Robinson in ibid. **29**: 308 (1894)—Nakai, l. c. (1924), pro parte—Tatewaki, Phytogeogr. Mid. Kuril. 196, 249, 267 (1933); in Acta Phytotax. Geobot. **2**: 232 (1933)—Tatew. et Kobay., l. c. (1934)—Hara, l. c. (1937)—Hult., l. c. 168 (1934); l. c. 670 (1943).

'*S. Linnaei* Presl': Miyabe et Miyake, l. c. (1915)—Tatewaki, Phytogeogr. Mid. Kuril. 196, 226 p. p., 267 (1933).

S. maxima var. *crassicaulis* (Wats.) Hara, l. c. (1939); l. c. (1952).

Plant glabrous throughout.

Specim. exam. **Kuriles**: Isl. Shumushu (Aug. 21, 1932, H. Koidzumi—TNS 39012), in part; Minamijima, Isl. Ushishir (Sept. 12, 1929, M. Tatewaki & K. Takahashi, no. 15872—SAP); Kitajima, Isl. Ushishir (Aug. 11, 1928, M. Tatew. & Y. Tokunaga, no. 12550—SAP); near Ishikuzure-hama, Isl. Ketoi (Aug. 17, 1929, M. Tatew. & K. Takah., no. 15365—SAP); near Nakadomari, Isl. Shimushir (Aug. 18, 1928, M. Tatew. & Y. Tokun.—SAP) in part; west of Tokotan, Isl. Urup (Sept. 3, 1927, M. Tatew. no. 9987—SAP); Kobune, Isl. Urup (Aug. 26, 1927, M. Tatew. no. 9782—SAP); Rakko-iwa, Isl. Etorofu (or Isl. Iturup) (Aug. 4, 1930, H. Koidzumi, nos. 24473-75—TNS); rocky place, Isl. Kunashiri (Aug. 14, 1929, H. Koidzumi, nos. 21915-21—TNS); Anama Isl. Shikotan (Jul. 22, 1909, H. Takeda—TNS 29791).

Saghalien: Usutomanai, Ushoro Distr. (Aug. 15, 1906, K. Miyabe & T. Miyagi—SAP); Chipisani, Ôdomari Distr. (July 15, 1906, K. Miyabe, T. Miyagi & T. Miyake—SAP); Manue, Toyohara Distr. (Aug. 20, 1907, T. Miyake—SAP); Todogahama, Isl. Todomoshiri (July 23, 1906, T. Miyake—SAP); Okino-shima Isl. Todom. (July 25, 1931, Kimoto, Murayama & Takeë—SAP); Ins. Kaiba (i. e. Isl. Todomosiri) (Aug. 19, 1929, S. Saito—Herb. H. Hara).

Japan: *Hokkaido*: Isl. Daikoku, prov. Kushiro (Jul. 2, 1932, S. Akiyama, no. 231—TI); Nemuro, easternmost Hokkaidô (Aug. 2, 1935, S. Sakaguchi, no. 41—TI); Kinachashinai, Abashiri-machi, Abashiri-gun, prov. Kitami (Aug. 6, 1931, H. Iwamoto, no. 892—TI).

Distr.: s. Saghalien, the Kuriles, Kamtschatka, the Aleutians, s. Alaska, along the coast southwards to California, and Hokkaido in Japan.

This is normally a seashore plant growing on sandy beaches with one, long-leaved, central rosette. Almost always the species is annual both in the Far East and in western N. America, although larger amount of American specimens have to be examined. This view does not concord with Hultén's, since according to him *S. litoralis* and *S. crassicaulis* are perennial "with sterile basal rosettes of leaves."

I am compelled to say, however, that the presence of non-flowering basal rosette of leaves in herbarium specimens or living plants is not believed to be directly connected with the perennial habit.

S. litoralis and *S. crassicaulis* are here considered to be the same as *S. maxima* chiefly based on the similarity of the seed character. The sculpture of the surface of seeds is variable in these "species" from smooth to granulate as described above. It must be pointed out that the isotype of *S. litoralis* which I examined is not a much smaller plant but is stouter and larger-flowered than the plant from northern Japan. Its seeds are smooth contrary to the original description and the figure 8 (cf. Hultén, 1928), and the plant is also difficult to regard as perennial. *S. crassicaulis* is said to be perennial and glabrous. Specimens which I examined are for the most part annual, and branches, pedicels and sepals are entirely glabrous to glandular-pilose. Even in some "glabrous specimens" 1–3 glandular hairs can be found. Thus the differences between these two entities remain unclear, and I have to regard them as conspecific as done already by Nakai (1924) and Hara (1937, '39, '52, '58). *S. maxima* A. Gray in the original sense fits a northern form with scanty glandular hairs, and it is distributed on the coasts of Honshû, Hokkaidô, southern Saghalien, the Kuriles, Kamtschatka in east Asia, and through the Aleutians to the southern part of Alaska in America. From Hokkaidô to N. America *crassicaulis*-form is not uncommonly met with as an extreme form. The glandulosity becomes, however, gradually denser towards the south along the coast of Japan, and *S. maxima* var. *littorea* (Mak.) Hara is an extremely stout and glandular form distributed from central Honshû through the Ryukyus to Formosa. There is no phytogeographical reasons for doubting its occurrence along coastal southern China, although I have seen only one specimen.

In warmer temperate east Asia, the species grows not seldom in the interior becoming slenderer and having less glandular hairs. Such is the case being hardly possible to distinguish *S. maxima* and *S. japonica* without ripe seeds. The inland form is exactly known at least in Asia, and western American *S. occidentalis* Wats. may, in some possibility, be the same as the Asiatic.

The northern plants tend to have shorter glandular hairs of (2–) 3–4 cells and those in the southern plants of (3–) 4–5 (–6) cells. The colour of the seeds is lighter in general in the northern plants, but it is often darker brown in those of the south. The texture of valves of the capsule varies according to the conditions of habitat and does not merit a ground for the taxonomic ranking. Indeed the specimens from Yunnan and Tibet are referable to *S. maxima* specifically, but there is not any character leaving it alone to either of the extremes. This is also true for an inland form in Japan. When maritime plants alone are considered, var. *maxima* in the north and var. *littorea* in the south can be named as geographical races. Taking into consideration the inland plants, I can not advance to recognize them as varieties at present, but to set up f. *maxima* with glandular hairs and entirely glabrous f. *crassicaulis*.

Species uncertain to me.

Sagina? quinquevalvis Gilli in Fedde, Repert. **59**: 170 (1956).—Pl. I.

Specim. exam. **India**: "*Indiae orientalis*" (Jacquemont, nos. 439 & 2020—P); above Rangdum to Pensi La, Zanskar, Kashmir, in bare spot in river plain, alt. 11000 ft. (Sept. 13, 1931, W. Koelz, no. 2945—DD).

These specimens are in every respect closely akin to perennial *S. saginoides* except for their seemingly annual habit, and they match fairly well with Gilli's description. Although Gilli's description lacks the character of the seed, above cited specimens have the seed of *S. saginoides*, but the colour is orange-brown.

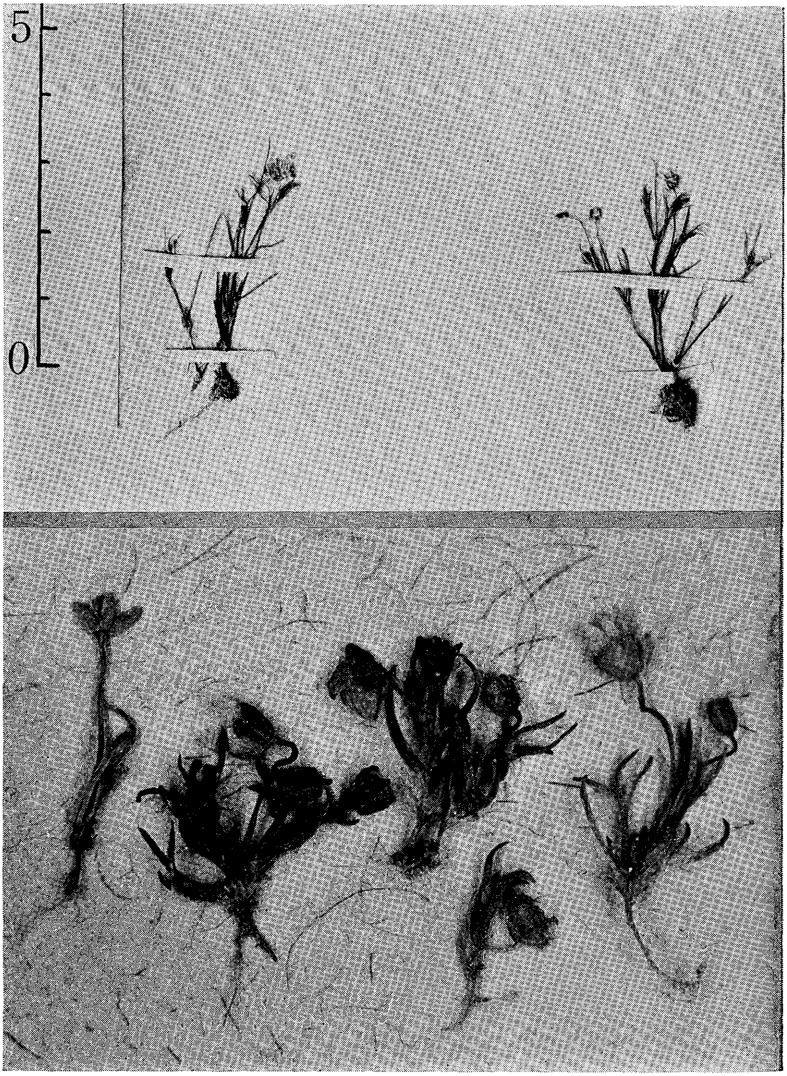
The climatic conditions between 2200–3600 m in this region may be milder than those in the arctic-alpine regions, and *S. saginoides* might have been allowed to flower annually and temporarily. See also notes under *S. saginoides*.

東亜温帯域を大略北緯 20-50°, 東経 75-155° の内に取れば, 平地の雑草としてのツメクサ (*S. japonica* Ohwi), 特に海岸に多いハマツメクサ (*S. maxima* A. Gray), 本邦では高山頂に稀産するのを確認したチシマツメクサ (*S. saginoides* Karsten), 東亜の産 (北千島) を確認したシムシュツメクサ一名ヒメツメクサ (*S. intermedia* Fenzl) の 4 自生種, イトツメクサ (*S. apetala* Arduino) と トヨハラツメクサ (*S. procumbens* L.) の 2 帰化品がある。

永年の間混同されて来たチシマツメクサ, ハマツメクサ, ツメクサは熟した種子さえあれば簡単に区別出来る。J. D. Hooker のインド植物誌以来約 1 世紀の間誤られて来たヒマラヤ産 "*S. procumbens*" は全部チシマツメクサであると言っても過言ではない。ハマツメクサやツメクサは時に山上に生じ, 真の自生か否かを判断し難いことがあり, 雲南省, チベット, ヒマラヤ山脈の高処にまで産することを知ったが, これも人為伝播か否かを決する術がない。両種の下に内陸形と海岸形, 或は北方形と南方形を区別命名して見ても結局実用にはならない。此のことはツメクサよりも広く分布するハマツメクサに於て明かである。

欧亜大陸全体の種類を見ると, 邦産のツメクサとハマツメクサ以外は皆種子背面に明かな溝があるのに気附くが, 内的形質例えば核形態学的知見などとの相関は見られない。

本研究 1—5 報は其の一部を文部省科学研究費綜合研究費に負うている。末尾ながら記して感謝の意を表する次第である。



Sagina? *quinquevalvis*. Upper: from "Indiae orientalis" scale in cm.; lower: from Kashmir, NW India. ×3.5.

M. MIZUSHIMA: *Sagina*